

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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IN THE APPLICATION OF:

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EXAMINER: S. COSTALES

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GROUP ART UNIT: 1764

**TITLE: Transmission Lubricating Compositions with Improved Performance, Containing Acid/Polyamine Condensation Product**

Wickliffe, Ohio

Hon. Commissioner for Patents  
P. O. Box 1450  
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Declaration Under Rule 132

Sir,

I, James L. Sumiejski, declare as follows:

1. I received a Bachelor of Science degree in 1975 from University of Wisconsin-Milwaukee and a Master of Science degree in the field of Organic Chemistry in 1977 from University of Michigan. I have been employed by The Lubrizol Corporation since 1978. From 1978 to 1985 I was responsible for the development of various lubricant additives while working in the Research Division. In 1985 I was promoted to Project/Technology manager for Automatic Transmission Fluids. Since that time I have been responsible for formulating lubricants for transmission systems, including automatic transmissions, dual clutch transmissions and continuously variable transmissions. I am one of the inventors in the above-mentioned application, and I am familiar with the references which were used in the rejection thereof.

2. In order to illustrate that certain phosphorus-containing compounds, specifically hydrocarbyl phosphites with carbon chain lengths of at least 12, have unexpected performance advantages over hydrocarbyl phosphites with carbon chain

lengths of less than 12, the following experiments were performed under my supervision.

3. Two lubricating compositions were prepared as summarised in the Table below. The comparative Example is Example 3 from US 6,103,673; and the example of the invention is similar. The difference between the two compositions is that in Comparative Example 3, the alkyl hydrogen phosphite used was dihexyl hydrogen phosphite, whereas in the example of the invention, the alkyl hydrogen phosphite used was a di-C<sub>14</sub> alkyl hydrogen phosphite. The amounts shown for the formulation components include the conventional amounts of diluent oil present in the commercial materials. The compositions prepared are as shown:

Formulation Components (parts by weight)	Comparative Ex 3 of US 6,103,673 (CE1)	Example of the Invention (IVEX1)
Oil of lubricating viscosity	100	100
Shear stable dispersant viscosity modifier	7.4	7.4
Overbased calcium sulphonate, including 0.42 parts diluent oil	0.84	0.84
Overbased calcium salicylate, including 0.16 parts diluent oil	0.40	0.40
Dibutyl hydrogen phosphite	0.15	0.15
Alkyl hydrogen phosphite		
C6 alkyl	0.08	—
C14 alkyl	—	0.08
Phosphoric acid (85 %)	0.04	0.04
Borated alpha olefin epoxide	0.2	0.2
1-hydroxyethyl-2-heptadecenyl imidazoline	0.02	0.02
Amine dispersants, mixture of borated, non-reacted and species reacted with CS <sub>2</sub>	2.0	2.0
Antioxidants	0.9	0.9
Seal swell agent	0.6	0.6
Corrosion inhibitor	0.03	0.03

Dye	0.025	0.025
Antifoam agents	460 ppm	460 ppm
Additional diluent oils	3.8	3.8

4. Examples CE1 and IVEX1 were analyzed using the test methodologies of the MERCON®V  $\mu$ -V Characterization negative slope test. The test method is described in detail in the Ford MERCON®V Specification for Automatic Transmission Fluids trademarked for service in vehicles sold by the Ford Motor Company. The intent of this test is to evaluate the low-speed anti-shudder performance of transmission fluids on an SAE No.2 Machine.

The tests were carried out at Southwest Research Institute.

5. The experimental results obtained from the test are as follows:

	Plate Wear		Anti-Shudder Performance	
	Wear (mm)	Wear Visual Analysis	Total Number hours (hr)	Slope Type
CE1	0.42	medium discoloration	85	negative
IVEX1	0.20	light discoloration	115	not negative

6. Normally, the conventionally established passing criterion for plate wear in this test would be a maximum of 0.076 mm. However, at time the tests were performed, it is believed that the batch of plates used in the test uncharacteristically exhibited more excessive wear than is commonly acceptable, resulting in an uncharacteristically severe test. Even under these severe conditions, the composition of the invention exhibited markedly less wear than did the comparative composition.

7. The slope (negative versus not negative) in the Anti-Shudder performance portion of the test refers to the slope of the friction curve when torque (friction coefficient) is plotted versus speed in revolutions per minute (rpm). The slope is calculated using the ratio of the torques at 2 and 20 rpms and the ratio at 40 and 120 rpms. When these ratios exceed 1.00 the fluid is defined as having developed a negative slope characteristic. Negative slope development is an indication that the fluid will cause unacceptable shudder or vibration in the

automatic transmission which can be felt by the vehicle driver. When negative slope develops in this test, the fluid is considered a fail for this particular performance requirement. The results showed that the material of the present invention maintained a satisfactory (non-negative) slope for the 115 hour duration of the test, while the slope of the material of the comparative example became negative after 85 hours. This is significant because Ford have determined that a fluid that completes the entire test (115 hours) without any negative slope development will have demonstrated acceptable anti-shudder durability performance and will be acceptable for use in Ford automatic transmissions.

8. The results shown above indicate that the lubricating composition of the invention containing an alkyl hydrogen phosphite of at least 12 carbon atoms unexpectedly has significantly improved wear performance and anti-shudder performance compared with the comparative example.

9. I further declare that all statements herein made of my own knowledge are true and all statements herein made on information and belief are believed to be true. I understand that wilful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

James L. Sumiejski  
James L. Sumiejski

4/28/2006

Date